

A Review of the Innovation Policy of the U.S. Government

Sidu Liu^{1,*}

¹ School of Beijing huijia private school, Beijing, China

*Corresponding author. Email: liusidu0624@163.com

ABSTRACT

United States is a developed country and has long been at the forefront of cutting-edge technological innovation. Therefore, its various policies have certain reference significance. This paper mainly studies the innovation policy of the United States and introduces the multiple level of innovation system in the United States from three aspects: history, importance, and policy content. Mainly focusing on the policy content, this paper analyzes the advantages and disadvantages of the United States under the innovation policy from multiple angles, combined with its environmental factors. The policy content mainly includes five aspects: subsidy policy for infant enterprises and small and medium-sized enterprises, STI policy, immigration, and talent flow, stimulating technological and energy innovation and establishing intellectual property right. The research shows that the United States attaches great importance to innovation policy, which is fully reflected in the comprehensiveness of covering multiple fields and the appropriateness of adapting to the social environment. This has a great inspiration for the establishment of innovation policies in other countries.

Keywords: Innovation, Government Policy, US, STI

1. INTRODUCTON

1.1. Research Background

Innovation policy is public action that influence technical change and other kinds of innovation [1]. Nowadays, most of the country engage in innovation by setting various of innovation policy. The following diagram shows the ten most innovative countries by calculating their innovative index in 2021.

Table 1. The Innovative Index among Countries

Rank	Economy	Income Group Strength/weakness	Strength /Weakness	Score
1	Switzerland	Strength	Strength	65.5
2	Sweden	Strength	Strength	63.1
3	United states of America	Strength	Strength	61.3
4	United Kingdom	Strength	Strength	59.8
5	Republic of Korea	/	/	59.3

6	Netherlands	/	Strength	58.6
---	-------------	---	----------	------

Source: <https://www.globalinnovationindex.org/analysis-indicator>

The table shows that the innovative index of US is in the third rank with a innovative index of 61.3 and two “strength”. Therefore, it is valuable to do research to investigate their government innovation policies. This paper mainly studies the innovation policy of the United States and introduces the multiple level of innovation system in the United States from three aspects: history, importance and policy content. Mainly focusing on the policy content, this paper analyzes the advantages and disadvantages of the United States under the innovation policy from multiple angles. Combined with its environmental factors. The policy content mainly includes five aspects: subsidy policy for infant enterprises and small and medium-sized enterprises, STI policy, immigration and talent flow, stimulating technological and energy innovation and establishing intellectual property right. All of those factors play an important role in competitiveness within countries.

1.2. Research Significance

Firstly, the term “innovation” is the production of

something new. It acts as an important role in macro level as well as in micro level. In micro level, the innovation boost business's competitiveness and increase organization's ability to achieve the progress. If there is no innovation, which means that there is not anything new, then the firms and the organization cannot stand out within the market. In macro level, innovation processing is really importance to economic growth. "According to the aforementioned Stanford study, innovation has been responsible for up to 85% of all economic growth." Not only that, it can gradually reduce the society instability by promote the equity in income throughout the populations. In addition, the technology development increases the communication and thus the education accessibility, and further increase the physical capital and human capital. Finally, increase the economic well-being by increasing the living standard. What's more, the innovation process link government, business and university in a line, which is a sustainable process.

1.3. Research Contents and Framework

This paper is divided into four parts. The first part is an introduction, which describes the important application of innovation in the international scene and its importance to economy and society. The second part is the introduction of policies from five aspects - New Enterprises & small and medium sized enterprises, science and technology innovation (STI) policy, migration & talent flow, technology & energy innovation and integral property. From the perspective of historical development, it describes the objectives and completion of various government policies, as well as their contributions and defects to social development. The third part is the conclusion, which mainly summarizes and arranges the second part of the policy, as well as the author's own views and opinions on the policy. The fourth part is references, which contains nearly 25 references.

2. LITERATURE REVIEW

2.1. New Enterprises & Small and Medium-sized Enterprises

The United States has accumulated rich successful experience in legislative support, financial support and innovative service support [4]. Innovation is considered a cornerstone of entrepreneurial activity for generating innovations [5]. Landau and Jorgenson assert that innovation, which consists of invention and implementation, depends on policies that "encourage entrepreneurship, risk-taking investment, and technological change. The reasons for the dominance of many high-tech industries in the United States after the war are analyzed from the two fields of biotechnology and information technology, and the characteristics of American business environment are found and

summarized. The establishment of government policies makes full use of these characteristics and helps the United States play a leading role. The characteristics of American business environment mainly include the following: Firstly, the U.S. government's use of public policy is not affected by political or social problems, which enables it to successfully lead the research direction of enterprises to the predetermined direction. At the same time, the establishment of innovation policy in the United States is not concentrated in one region, and its management institutions are decentralized and based on different task priorities.

In addition, the United States has a variety of initiatives and sources of innovation, which are suitable for promoting the success of industries with rapid technological development and uncertain direction, by enabling new enterprises to quickly and correctly identify research fields [3]. However, ELISA Giuliani poses a major challenge, that is, the improper business behavior of transnational corporations may prevent the implementation of innovation policies. This will lead to the economic growth driven by innovation and the inability to repair the system, so as to solve the increasing inequality, global warming, modern slavery, child labor and other human rights struggles. "I challenge technological determinism and 'transformative change' frameworks by arguing that the regulation of global capitalism needs to put powerful private actors at center stage [6].

2.2. Science and Technology Innovation (STI) Policy

Science, technology and innovation (STI) policy is shaped by a lasting framework in the historical context. Although it is common to use the term STI policy as one type of policy, one could think of it as three different "ideal" types of policies—science policy, technology policy, and innovation policy—each with distinct characteristics (Lundvall & Borrás, 2005). Science policy is about the promotion of the production of scientific knowledge and, as such, deals with the allocation of resources between different scientific activities. Science policy might serve different objectives from pure curiosity about understanding the world to specific military objectives such as the atomic bomb (Jaffe et al., 2015). Science policy is sometimes based upon a linear model where it is assumed that research efforts will translate more or less automatically into economic and societal outcomes.[16]

It mainly includes three frameworks, and each framework corresponds to an innovation model - the first framework is innovation for growth. Ω started after World War II, the government initially supported the institutionalization of science and R & D, focusing on promoting economic growth; The second framework, called "national systems of innovation", appeared in the

1980s, focusing on improving competitiveness and solving the negative impact of economic growth on individual national states; The third framework, transformative change, distinguishes itself from the first two frameworks and focuses on achieving sustainable development goals, which are related to social and environmental challenges, such as inequality, poverty or climate change. It is still considered to be imperfect, but it has been gradually filled in recent years [7]. However, Ding Minglei and Chen Baoming studied the uncertainty of STI policy, mainly referring to the impact of the new policy of Trump on STI policy. After Trump took office, although he expressed concern about promoting technological innovation, his primary focus was to implement the priority issues raised during the campaign, including strengthening infrastructure, revitalizing manufacturing to create jobs, raising tariffs to reduce competition for foreign products, etc., many of which have potentially significant impacts on technological innovation. However, these priority issues may adversely affect STI policy. For example, tightening immigration policies may lead to the loss of foreign talents in the United States, which increases the uncertainty of the future direction of US technology and innovation policies. Therefore, the conflict between various types of policies should be carefully considered. A study by the national foundation for American policy shows that more than half of the American "unicorn" startups valued at more than \$1 billion are founded by immigrants, and about 70% of the management and product development positions of these enterprises are held by immigrants or their descendants [8].

2.3. Immigration and Talent Flow

There are many considerations for immigration, and the motivation is to open up better opportunities for education and work. Thus, doctor programs in the United States attract large numbers of international students [9]. Among them, highly skilled immigrants are an important part of American immigration policy. They are mainly divided into three groups: college students, Nobel laureates and inventors. Most immigrants have entered developed economies, especially the United States - the top four countries for immigrant inventors are the United States, Germany, Switzerland and the United Kingdom. Together, these countries account for 65 per cent of migrant inventors. However, in figure 1, X-axis is country and Y-axis is numbers of inventor emigrant, and it shows that the United States alone accounts for 57% of this total.

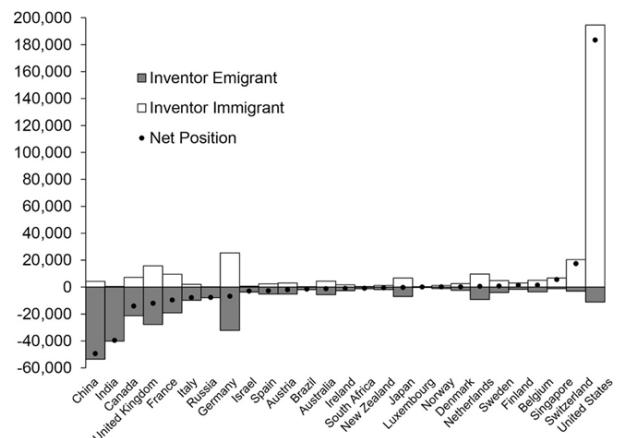


Figure 1 Numbers of Inventor emigrant and immigrant among countries

Sources: Data from World Intellectual Property Organization and Miguelez and Fink (2013).

Talent clusters represent places where the productivity of high-skilled workers is greatly enhanced by proximity to other high-skilled workers. The reason for the increase in productivity may be the industry's dependence on professional knowledge transfer and interaction, the ability to use the professional network between top companies to find the best matching potential between companies and talents, or the unique spirit of the ecosystem. In addition, talent clusters can break through the boundaries of innovation by selecting the best ideas [10].

2.4. Technology and Energy Innovation

Scientific and technological innovation policies help to stimulate and guide industries with great development potential and high economic contribution, clarify the development direction, and then accumulate and strengthen the foundation of technological development. From the perspective of resource allocation, the science and technology innovation policy overcome the deficiency of serving science and technology innovation in the market economy. It is a major reform and bold guidance for the existing science and technology management system and the market ecological pattern of the industry. It is of great significance to improve the multi-level Science and technology management policy system and improve the science and technology management department to serve the real industrial economy [11]. Scientific and technological innovation policy is mainly embodied in three systems - "legal system", "fiscal and tax system" and "service system". There are mainly two types of policies in the "legal system". One is the inclusive promotion policy, that is, the company can get subsidies when it applies, which lays a foundation for scientific and technological innovation and provides the motivation for the company to participate in it; The other is that the national security department specially supports the company's scientific

and technological innovation from various angles, such as technology transfer, financial funds and so on, which is mostly used in the medium or later stage. It can be seen that a series of policy support makes the United States integrate itself in law. It can be said that the US policy on scientific and technological innovation has been continuously improved and improved over time. The Sherman Act passed by the United States as early as 1890 provided a legal basis and guarantee for small enterprises to fight against the monopoly of large trust organizations. Subsequently, the United States successively passed the Clayton Act, Miller Tedding Act, Salter Kefour Act and other bills to continuously improve the antitrust law. In particular, the Small Business Act passed in 1953 laid the foundation of American small business policy and determined a series of policies to support small businesses. At the same time, the U.S. Department of Defense has promulgated a number of regulations to ensure that small and medium-sized enterprises participate in defense science and technology innovation. Small and medium-sized enterprises (SMEs) are non-subsidiary, independent firms which employ fewer than a given number of employees, and the United States considers SMEs to include firms with fewer than 500 employees. [17] For example, the Department of Defense has successively promulgated a series of Defense Department regulations, memorandums of understanding and partnership agreements, Federal Procurement Regulations (far), such as the small enterprise subcontracting plan, the small enterprise program of the Department of Defense, and maximizing the use of small enterprises in multiple contracts (including its supplementary provisions), so as to provide evidence for scientific and technological small and medium-sized enterprises to participate in national defense scientific and technological innovation, and establish a "multi-angle and multi-level" legal and regulatory system to support scientific and technological innovation of small and medium-sized enterprises [12]. In the "fiscal and taxation system", the United States enjoys "special financial subsidy policy", "financial low interest loan policy", "financial guarantee policy", "tax support policy", "national defense procurement policy" and "market financing policy". In the outline of the projects funded by the small and medium-sized enterprise management office of the U.S. Department of Defense in the market financing policy, the small enterprise entrepreneurship research program (SBIR program), the rapid innovation fund of the Department of Defense (RIF fund program) and the "mentor student" program (MPP program) aims to reduce potential risks and enhance the viability of the enterprise by providing talent training and guidance [12]. In "service system" It is composed of four levels, namely, government functional departments, social independent service institutions, industry association service institutions and hybrid service institutions, which provide multi-level and comprehensive services and enterprises to provide

innovative services. In addition, the U.S. Department of Defense has established a variety of information release platforms and has expanded the country to the greatest extent by widely publishing institutional announcements and soliciting innovation schemes Open competition scope of anti-science and technology plan [12].

2.5. Intellectual Property

Many articles show that the management of intellectual assets in general and intellectual property rights in particular is becoming more and more important. The value of enterprises in knowledge intensive activities depends on the value of their intellectual property rights. Intellectual property is used as financial assets. The company has allocated more human resources for intellectual property management and its training [13]. In 1980, the amendment to the Patent and Trademark Act passed by the U.S. Congress pointed out that technology transfer to private enterprises is an important goal of government funded R & D activities. In the same year, the US Congress also passed the technological innovation act, which aims to establish a linkage mechanism between knowledge producers and knowledge users [14]. In 1984, the United States Congress passed the national cooperation act, which aims to reduce the risk of antitrust lawsuits against enterprises due to cooperative R & D. In 1986, the U.S. Congress passed the federal technology transfer act to encourage national laboratories to cooperate with industry to establish scientific research consortia to promote technology transfer, diffusion and commercial application.

In 1990, President Bush announced that private enterprises issued exclusive patent licenses, which accelerated the process of patent creation, application, transfer and commercialization, and significantly improved the efficiency of R & D activities and the utilization of scientific and technological resources [15].

3. CONCLUSION

3.1. Conclusions of Finding

By reading the relevant literature on US policy towards innovation by relevant scholars in recent years, this paper gives a lot of inspiration. In the process of research, this paper finds that the United States attaches great importance to innovation policy, which is fully reflected in the comprehensiveness of covering multiple fields and the appropriateness of adapting to the social environment. This article sorted and classified the existing research results, which can be summarized as follows: In terms of encouraging infant enterprises and small and medium-sized enterprises, the United States has made full use of its own social conditions and implemented policies based on the purpose of

"encouragement enterprise, risk taking investment, and technical change", and achieved good results. However, there are still obstacles this time, that is, improper transactions of multinational corporations may hinder the implementation of innovation policies for small and medium-sized enterprises, and there are still risks.

In terms of scientific and technological innovation, science, technology and innovation policy (STI) is one of the indispensable policies. With the development of history, STI policy has three parts: Innovation for growth, national systems of innovation and transformative change. These three frameworks are still being improved. Talent flow has a great impact on innovation, especially in higher education. Data shows that in recent years, most highly educated talents have emigrated to the United States, which has greatly improved their productivity. Scientific and technological innovation policy is mainly reflected in three aspects: legal system, fiscal and tax system, and service system. The "legal system" mainly includes two policies, which provide the company with the power to start and continue the innovation process. "Fiscal and taxation system" mainly improves the viability and competitiveness of enterprises through the cultivation of talents. The "service system" provides innovative services for enterprises in many aspects and at many levels, increases the scope of competition and further encourages innovation at one time. Similarly, the United States has paid more and more attention to the management of intellectual property rights. Since 1980, it has continuously improved and protected intellectual property rights through various laws, which has brought protection to the company's innovation plan.

3.2. Future Studies

Later research can focus on exploring the innovation policies of other countries, which can be divided into developing and developed countries, and explore whether the innovation policies applied by the United States can be applied to these two countries. The economic and social conditions of each country are different, and it is too simple to classify them by only two categories: developing and developed countries. Therefore, it is also necessary to eliminate different social factors as far as possible in combination with the social conditions of different countries or compare the effects of American innovation policies in the face of different social factors.

REFERENCES

- [1] Edquist C. (2001) Innovation Policy in the Systems of Innovation Approach: Some Basic Principles. In: Fischer M.M., Fröhlich J. (eds) Knowledge, Complexity and Innovation Systems. Advances in Spatial Science. Springer, Berlin, Heidelberg.
- [2] Rincke, J. . Competition in the Public School Sector: Strategic Interaction and Policy Innovation Among US School Districts.
- [3] Owen, Geoffrey (2017) Lessons from the US: innovation policy. Policy Exchange, Westminster, London.
- [4] Wang, X. R. , & Ji, M. A. . (2009). The us policy support to the smes' scientific and technological innovation. Commercial Research.
- [5] Akerlof, G.A. (1970). The market for 'lemons': Quality uncertainty and the market mechanism. Quarterly Journal of Economics, 84(3), 488–500.
- [6] Elisa Giuliani. (2018, November). Regulating global capitalism amid rampant corporate wrongdoing—Reply to “Three frames for innovation policy”. Pages 1577-1582.
- [7] JohanSchotW. EdwardSteinmueller. (2018, November). Three frames for innovation policy: R&D, systems of innovation and transformative change. Pages 1554-1567.
- [8] Sina Technology. The survey shows that more than half of Unicorns in the United States are founded by immigrants [EB / OL] (2016-03-18)[2016-12-20].
- [9] William R. Kerr. The Gift of Global Talent: Innovation Policy and the Economy
- [10] Related work includes Carlino and Kerr (2015), Kerr et al. (2017), and Kahn and MacGarvie (2016).
- [11] ALLEN L, BEIJERSBERGEN M W, SPREEUW R J, et al.Orbital angular momentum of light and the transformation of Laguerre-Gaussian laser modes. [J].Physical Review.A , 1992 , 45(11):8185-8189.
- [12] Yu Dongcheng, Wen Weiyi, & Li Changrui (2019). Research on the policy system to promote the participation of scientific and technological small and medium-sized enterprises in national defense scientific and Technological Innovation --from the perspective of American experience. Practice Microcomputer information
- [13] Petr Hanel. (2006, August).Intellectual property rights business management practices: A survey of the literature. Pages 895-931.
- [14] Jian-Jun, L. I. . (2007). The policy ideas and mechanism innovation on us atp. Journal of Dialectics of Nature.
- [15] Connie K.N.Chang, Stephanie S.Shipp and Andrew J.Wang(2002).The Advanced Technology Program:a public-private partnership for early stage

technology development, Venture capital, 4,NO.4,
363

[16] Cristina Chaminade, Bengt-Ake Lundvall. (2019).
Science, Technology, and Innovation Policy: Old
Patterns and New Chanllenges.

[17] OECD. (2005). OECD SME and Entrepreneurship
Outlook.